

# **HOVENWEEP AND NATURAL BRIDGES NATIONAL MONUMENTS RESEARCH SUMMARY 2011**

**1) Study Title:** Soil Survey of Hovenweep National Monument, Utah

**Permit No.:** HOVE-2011-SCI-0001

**Principal Investigator:** Victor Parslow

**Purpose of Scientific Study:** To provide an updated soil and ecological site inventory for Hovenweep National Monument that meets National Cooperative Soil Survey (NCSS) standards and park management and planning needs. The existing soil surveys were conducted in the 1970s and the early 1980s as part of the Henry Mountains, San Juan County, Central Part, and the San Juan County, Navajo Indian Reservation, Utah soil surveys. These inventories were primarily designed as a tool for use in managing grazing lands and have been found to be too general to be useful in managing the park. Information is insufficient to model salt movement, mitigate visitor impacts, identify and protect habitat of Threatened and Endangered species, and other park responsibilities. The parts of the Hovenweep NM in Colorado were mapped in the Cortez Area, Colorado soil survey which is of more recent vintage and more detailed than the older surveys. It is anticipated that less field work will be required in this area than on the Utah side. Ecological site descriptions will be correlated to a common standard crossing the state line. In 2003, representatives of the National Park Service approached the Natural Resources Conservation Service to update the existing soil surveys within Arches and Canyonlands National Parks, Natural Bridges and Hovenweep National Monuments and the Orange Cliffs portion of the Glen Canyon Recreation Area. The Plan of Work and contract were approved in 2004. This application is seeking permission to carry out the field work necessary to complete the contract.

**Findings/Accomplishments for 2011:** No activity was conducted this report year.

**2) Study Title:** Southern Utah Visitor Profile Study 2010

**Permit No.:** HOVE-2011-SCI-0002

**Principal Investigator:** Emmett Steed

**Purpose of Scientific Study:** The purpose of this study is to understand Southern Utah's tourists, who stay overnight and travel more than 50 miles from their homes. The research seeks to answer the following questions:

1. What are the demographic characteristics of Southern Utah visitors?
2. What relationships exist among Southern Utah visitors in regard to place of origin, Southern Utah destinations visited, transportation utilized, activities selected while in Southern Utah, and trip expenditures?
3. Are there seasonal differences in origin, destinations, activities, and expenditures?
4. What are the information sources utilized by Southern Utah visitors?

**Findings/Accomplishments for 2011:** The Utah Office of Tourism partnered with the Southern Utah University Hospitality Research Center to conduct a Central/Southern Utah Visitor Profile study. Visitors to four Central Utah Counties and eight Southern Utah Counties were asked to complete surveys that were designed by three Southern Utah University professors. Visitors were asked to complete the surveys in four different seasons. The surveys were completed by hand, by returning an e-mail attachment, or by going to a website. There were 1,113 useable surveys completed. Four research questions guided the survey and analysis. Each question is stated below with a summary of its key findings.

I) What are the demographic characteristics of Southern Utah visitors?

The majority of visitors to the Central/Southern Utah area were: 1) over 45 years old; 2) have a household income greater than \$80,000; 3) spend \$100 per day in lodging and \$50

per day in food and beverage; 4) are married with no children under 17 years old in their household; 5) have at least a college education; and 6) visit National Parks frequently.

II) What relationships exist among Southern Utah visitors in regard to place of origin, Southern Utah destinations visited, transportation utilized, activities selected while in Southern Utah, and trip expenditures?

One of the most important findings was that geographic origin was not a valid predictor for places visited, activities selected, or expenditures made. In other words, no matter where people come from, once in Central/Southern Utah, they visit similar places, select similar activities, and spend similar amounts of money. The further away a visitor lived from Southern Utah, the more likely she was to travel by airplane.

III) Are there seasonal differences in origin, destinations, activities, and expenditures?

There were distinct patterns in visitors' origins, destinations, activities and expenditures by season. For example, domestic visitors from Pacific states were more likely to visit in the spring and summer while mountain state visitors were more likely to visit in the fall and winter ( $X^2=.000$ ). International visitors vary by season as well. For example, English speaking tourists from Great Britain, Canada, Australia and New Zealand were more predominant in the spring; Winter received the most returning visitors 74% ( $X^2=.045$ ). Destinations and activities varied by season as well. The destination seasonal patterns followed the activity patterns with national parks receiving the most visits in the summer and spring. The most popular activities included visiting national/state parks (79.5%), touring/sightseeing (70.4%), and hiking (65.2%). Visiting state/national parks increase in the spring and summer ( $X^2=.020$ ). Touring and sightseeing follows this same pattern ( $X^2=.003$ ), while hiking, as can be expected, decreases in the winter ( $X^2=.027$ ). Visitors spent more money in the summer, spending more on lodging ( $X^2=.002$ ), food ( $X^2=.008$ ), rental cars ( $X^2=.025$ ), recreation fees ( $X^2=.004$ ), and park fees ( $X^2=.009$ ) than in other seasons.

IV) What are the information sources utilized by Southern Utah visitors?

Southern Utah visitors stated the internet (82.6%), past experience (79%), and friends and relatives (63.5%) were either very influential or somewhat influential information sources.

**3) Study Title:** U.S. Regional Climate Reference Network (USRCRN) program (formerly, Historical Climatology Network Modernization, USHCNM).

**Permit No.:** NABR-2010-SCI-0003

**Principal Investigator:** Dennis Atkinson

**Purpose of Scientific Study:** Support for the Department of Commerce (DOC), National Oceanic and Atmospheric Administration's (NOAA) U.S. Regional Climate Reference Network (USRCRN) program (formerly, Historical Climatology Network Modernization, USHCN-M). The purpose of the USRCRN program is to provide a surface meteorological monitoring network that will allow scientists and the research community to have high quality data for use in climate evaluations and studies. These studies will allow determinations to be made with respect to regional climate signals, as they relate to different climate regimes. These climate studies will help predict and inform changes that affect humans, fauna, and flora, in addition to impacts on national, economic, and social infrastructures. This meteorological data will provide valuable on-site data for the National Park Service to monitor climate affects on sensitive elements throughout the parks and climate changes that affect the viability and use of the parks.

**Findings/Accomplishments for 2011:** This site is currently transmitting temperature and precipitation measurements. The latest data is available from the following URL: <http://www.ncdc.noaa.gov/crn/usrcrn/>

**4) Study Title:** Southern Utah Visitor Profile Study 2010

**Permit No.:** NABR-2011-SCI-0001

**Principal Investigator:** Emmett Steed

**Purpose of Scientific Study:** The purpose of this study is to understand Southern Utah's tourists, who stay overnight and travel more than 50 miles from their homes. The research seeks to answer the following questions:

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IV) What are the information sources utilized by Southern Utah visitors?

Southern Utah visitors stated the internet (82.6%), past experience (79%), and friends and relatives (63.5%) were either very influential or somewhat influential information sources.

**5) Study Title:** NCPN Integrated Riparian Monitoring in Natural Bridges National Monument

**Permit No.:** NABR-2011-SCI-0002

**Principal Investigator:** I&M (NCPN)

**Purpose of Scientific Study:** The National Park Service's Inventory and Monitoring Program (NPS I&M), in collaboration with 32 monitoring networks, are charged with monitoring natural resources. Vital signs represent a select set of physical, chemical and biological elements and processes of park ecosystems that are chosen to represent the overall health and condition of a park's resources. Together, the Northern and Southern Colorado plateau Networks (NCPN and SCPN) have developed conceptual models of key ecosystems and identified an integrated set of vital signs for tracking resource conditions at 35 NPS units within or near the Colorado Plateau (Thomas et al. 2004, O'Dell et al. 2005). Riparian systems are a high priority vital sign for the NCPN (O'Dell et al. 2005). Riparian systems are disproportionately high in biodiversity relative to their spatial extent due to the year-round or at least frequent availability of water. In turn, healthy and natural riparian systems serve as a predictable source of water, and function to maintain the natural diversity of riparian-adapted plants and animals across the Colorado Plateau region. Various dynamics interact to influence riparian systems. Ground-water levels, flood disturbance intensity and frequency, plant population, dynamics, and even upland conditions and dynamics collectively interact to shape the in-stream conditions and vegetative features of a riparian zone. Monitoring the status and trends in representative attributes and effects of an array of patterns and processes is an overarching goal of the NCPN Integrated Riparian Monitoring effort. This effort is intended to provide park managers with information on the variability of riparian systems, and to provide early warning of system degradation. In the latter case, monitoring information can be used to determine the potential for mitigating actions, and where such actions are implemented, monitoring efforts can contribute to understanding the effects of these actions.

Riparian monitoring occurs in Armstrong Canyon in NABR. Specific objectives of the overall riparian monitoring effort are to determine the status and trends in:

- 1) the areal extent, cover, species composition and structure of riparian vegetation
- 2) exotic plant species
- 3) channel morphology of surveyed cross sections and the channel thalweg
- 4) floodplain ground-water levels and stream flow/discharge

Procedures for riparian monitoring incorporated pieces of the USGS Water Quality Assessment Program (Moulton et al. 2002) and EMAP procedures (Kaufmann et al. 1999) and were initially developed by Scott and Reynolds (draft). Further refinement has been completed by NCPN staff and by Steve Monroe and Ellen Soles of the SCPN. NCPN riparian protocols have been submitted for peer review.

**Findings/Accomplishments for 2011:** NCPN field crews established and sampled vegetation at Reach 2 and re-sampled vegetation at Reach 5 in Armstrong Canyon. Reconnaissance of potential future monitoring plots was also completed.

**6) Study Title:** Wood Documentation and Research, Natural Bridges NM

**Permit No.:** NABR-2011-SCI-0003

**Principal Investigator:** Tom Windes

**Purpose of Scientific Study:** This study is to continue the wood documentation and tree-ring studies started in 2000 while I was an archaeologist in the Anthropology Programs, Santa Fe Support Office, during an inventory survey of sites at NABR. The goal is to map and inventory all structural wood resources in the park at sites exhibiting structural integrity. These are perishable resources which have never been systematically recorded nor mapped, are suffering from deterioration from weathering, wet soils, vandalism, natural displacement and other causes, and are part of the NPS mandate to protect and preserve the natural and cultural resources. Wood not only provides one of the most informative pieces of cultural information in archaeology but also detailed environmental records of the past regarding climate, fire histories, etc. My team of researchers are experienced, having

worked in parks and other gov't lands throughout the Southwest, including Chaco Culture, Aztec Ruins, Mesa Verde, Pecos, and others, and form a unique team that records each piece of structural wood and the site within which it is associated. We also provide detailed maps of intact and semi-intact structures that provide the most-up-to date records of the cultural resources. Finally, dendrochronology is applied at each site to provide tree-ring dates, species use, and samples curated and protected from further deterioration.

**Findings/Accomplishments for 2011:** Work during July 2011 was part of a larger study that included cliff sites located on the Cedar Mesa/Slickhorn area administered by the BLM adjacent to and south of the monument. Two days (18-19 July) were spent in Natural Bridges National Monument at Horse Collar Ruin (42SA 6819) to finish wood documentation started in 2005. Twenty new pieces of structural wood (mostly *Populus* sp. niche lintels in Str. 6) were added to the wood documentation, producing a final number of 112 documented pieces of structural wood at the site. Two of the new pieces were collected for tree-ring analyses: a roofing splint from the collapsed roofing within Room 2 in the NE Unit (the majority of the juniper splints were left undocumented) and a large charcoal chunk of possible roofing lying on the open gravel 7 meters east of the roofed kiva (Str.11 in the SW Unit) where it was subject to possible foot traffic destruction. Our previous roofing samples from the roofed kiva (Str. 11) sample produced construction dates between AD 1245 to 1250, while Str. 6, an unroofed kiva, produced a sole cutting date of AD 1126 from a ventilator lintel. The few ceramics evident on the site were tallied (16 Mesa Verdean tradition) and correlate to the temporal range provided by the tree-ring dates. There were also 21 pieces of chipped stone (mostly Cedar Mesa formation red chert), 5 cores, 1 hammerstone, and 3 small mano fragments noted, as well as a small piece of malachite. None were collected. Architectural notes and measurements were made of each room and its features. Work at this site is essentially completed unless the individual roofing splints in Room 2 are documented in the future.